

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

COMPOSTING FACILITY

(No.)

CODE 317

DEFINITION

A facility to process raw manure or other raw organic by-products into biologically stable organic material.

PURPOSE

To reduce the pollution potential of organic agricultural wastes to surface and ground water.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Organic waste material is generated by agricultural production or processing.
- A composting facility is a component of a planned agricultural waste management system;
- A composting facility can be constructed, operated and maintained without polluting air and/or water resources;
- There is a need to improve air quality by reducing the emissions of odorous gases; and,
- The facility is operated as a component of an agricultural management system.

CRITERIA

General Criteria Applicable to All Purposes

Laws and Regulations. The installation and operation of the composting facility shall comply with all federal, state and local laws, rules and regulations ***governing pollution abatement, structures, health and safety.***

NRCS, NHCP
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The owner or operator shall be responsible for securing all required permits or approvals and for performing in accordance with such laws and regulations. NRCS employees are not to assume responsibility for procuring these permits, rights or approvals or for enforcing laws and regulations. NRCS may provide the landowner or operator with technical information needed to obtain the required rights or approvals to construct, operate, and maintain the practice.

Permits may be required from the following agencies:

1. *West Virginia Department of Health (WVDH)*
2. *West Virginia Department of Agriculture (WVDA)*
3. *Local health department*
4. *Refer to the Code of State Regulations (WV) for well head protection Table 64-46A.*

Safety. Safety and personal protection features and practices shall be incorporated into the facility and its operation as appropriate to minimize the occurrence of equipment hazards, ***spontaneous combustion*** and biological agents during the composting process.

Facility Siting. The bottom elevation of the composting facility shall be above the seasonal high water table and on soils with an acceptable permeability that does not allow materials to contaminate the ground water, and meets all applicable regulations, or the facility shall be installed on concrete slabs or other appropriate

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liners. ***Refer to Table 8 “Building Site Development” of the local USDA NRCS county soil survey for a general description foundation material’s restrictive soil features and provide site specific information as necessary.***

Ideally, compost facilities should be located outside of floodplains. However, if site restrictions require location within a floodplain, they shall be protected from inundation or damage from a 25-year flood event, or larger.

Locate the compost facility close to the source of manure/litter to minimize labor and reduce handling.

Locate compost facilities so prevailing winds and landscape elements such as building arrangement, landforms and vegetation minimize odors and protect the visual resource.

Direct surface runoff away from the compost facility.

Direct contaminated (animal litter) runoff from compost facilities to an appropriate storage or treatment facility for further management, as necessary.

Avoid locating composting facilities on slopes greater than 5 percent.

Facilities shall not be located in drainage ways or low areas where runoff may be concentrated and access may be hindered..

When possible, locate the composting facility down gradient from a wellhead, open water or sinkhole.

The facility shall be located a minimum distance of 200’ from a wellhead and a minimum distance of 300 feet from a neighboring residence.

Compost Mix. Develop a compost mix that encourages aerobic microbial decomposition and avoids nuisance odors.

Carbon-Nitrogen Ratio. The initial compost mix shall result in a carbon to nitrogen (C:N) ratio between 25:1 and 40:1. Compost with a greater carbon to nitrogen ratio can be used if nitrogen immobilization is not a concern.

Carbon Source. A dependable source of carbonaceous material with a high C:N ratio ***greater than 30*** shall be stored and available to

mix with nitrogen rich waste materials.

Woodchips, sawdust, straw or leaves are an example of carbon sources.

Bulking Materials. Add bulking materials to the mix as necessary to enhance aeration ***and provide structure and porosity to the compost mix.***

The bulking material may be the carbonaceous material used in the mix or a non-biodegradable material that is salvaged at the end of the compost period. If a non-biodegradable material is used, provision shall be made for its salvage.

Moisture Level. Provision may be made for maintaining adequate moisture in the compost mix throughout the compost period within the range of 40 to 65 percent (wet basis). ***A good method of determining the moisture content is to compare the composted material to the consistency of wet sponge that has been hand wrung. Avoid adding too little or too much moisture, either will have an adverse impact on composting process.***

In high precipitation climatic regions, care shall be taken to prevent excess moisture from accumulating in the compost. Facility covers may be required to provide for a suitable product.

Temperature of Compost Mix. Manage the compost to attain and then maintain the internal temperature for the duration required to meet management goals.

When the management goal is to reduce pathogens, the compost shall attain a temperature greater than 130°F for at least 5 days as an average throughout the compost mass.

This temperature and time criterion may be achieved during either primary ***and/or*** secondary composting stages or as the cumulative time of greater than 130°F in both stages. ***Long stem thermometers shall be purchased and be located on site to check and document the composting temperatures. Probe a minimum of three locations in each compost area and to different compost depths to determine if the compost is uniform.***

Turning/Aeration. The frequency of turning/aeration shall be appropriate for the composting method used, and to attain the desired amount of moisture removal and

temperature control while maintaining aerobic degradation. ***Equipment such as small front end loaders, aerators, etc. shall be available for initial layering, mixing, turning and hauling composted material and carbonaceous. Material shall be turned or rotated so that the proper aeration occurs and the top cooler material is placed midway or to the lower area of the new/secondary pile.***

Facility Type. Selection of the composting facility/method shall be based on the availability of raw material, the desired quality of final compost, ***type of equipment and dimensions***, labor, time and land available.

Facility structural elements such as permanent bins, concrete slabs and roofs shall meet the requirements of ***WV conservation practice standard*** Waste Storage Facility (313) and ***Animal Mortality Facility (316)***.

Facility Size. Size the compost facility to accommodate the amount of raw material planned for active composting plus space required for curing.

Dimensions selected for elements of the compost facility shall accommodate equipment used for loading, unloading, and aeration.

Sizing of facilities for composting dead animals shall be based on normal mortality loss records for the operation. If this data is not available, locally established mortality rates for the type of operation shall be used.

Compost Period. Continue the composting process long enough for the compost mix to reach the stability level where it can be safely stored without undesirable odors. It shall also possess the desired characteristics for its use, such as lack of noxious odor, desired moisture content, level of decomposition of original components and texture. The compost period shall involve primary and secondary composting as required to achieve these characteristics.

Test the finished compost as appropriate to assure that the required stabilization has been reached.

Use of Finished Compost. Land application of finished compost shall be in accordance with Nutrient Management (590) and Waste Utilization (633).

CONSIDERATIONS

Develop an initial compost mix with a carbon to nitrogen ratio of at least 30:1 to reduce most offensive odors.

Minimize odors and nitrogen loss by selecting carbonaceous material that, when blended with the nitrogenous material provides a balance of nutrients and porous texture for aeration.

A chemical neutralizing agent should be used if structural components do not provide adequate odor reduction.

Maximize solar warming by aligning piles north to south configured with moderate side slopes.

In humid areas, do not locate piles (windrows) across the slope to prevent ponding and soginess.

Protect compost facilities from the wind in cold climates. Wind protection may help prevent excess drying of the compost in dry climates.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

REFERENCES

- Northeast Regional Agricultural Engineering Service, Cooperative Extension "On-Farm
- NRCS Field Office Technical Guide (eFOTG), Section IV, Conservation Practice Standard - Composting Facility, 317.
- NRCS National Engineering Handbook, Part 637, Chapter 3, Composting
- NRCS National Engineering Manual (NEM).
- NRCS National Environmental Compliance Handbook
- NRCS Cultural Resources Handbook
- NRCS Agricultural Waste Management Field Handbook (AWMFH)
- ***210-VI-EFH Amend. 45, WV5 Preparation of Engineering Plans***

- ***210-V-NEM Part 505 – Non-NRCS Engineering Services***
- ***WV Engineering Field Handbook***
- ***Composting Handbook", NRAES-54.***

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OPERATION AND MAINTENANCE

Develop an operation and maintenance plan that is consistent with the purposes of this practice, and the life of the composting facility. Recipe ingredients and sequence that they are layered and mixed shall be given in the plan.

Safety requirements for operation of the composting facility shall be provided.

Manage the compost piles for temperature, odors, moisture, and oxygen, as appropriate. Make adjustments throughout the composting period to insure proper composting processes.

Closely monitor temperatures above 165°F. Take action immediately to cool piles that have reached temperatures above 185°F.

The operation and maintenance plan shall state that composting is a biological process. It requires a combination of art and science for success. Hence, the operation may need to undergo some trial and error in the start-up of a new composting facility.

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